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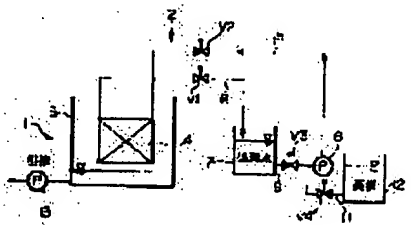
(54) METHOD FOR WASHING MEMBRANE WITH LIQUID CHEMICAL IN IMMERSION TYPE MEMBRANE FILTER AND DEVICE THEREFOR

(57)Abstract:
PURPOSE: To shorten washing time and to wash a membrane with a small amount of liquid chemical by discharging raw water in an immersion tank to expose the membrane to the atmosphere, and then allowing liquid chemical for washing to flow for the membrane from a treated water side of the membrane to a raw water side thereof.
CONSTITUTION: In a washing process using a liquid chemical, firstly, raw water in an immersion tank 3 is discharged by a pump 13 and a membrane module 4 is exposed to the atmosphere. In this state, valves V1, V3 are closed and valves V2, V4 are opened and a pump 8 is driven and liquid chemical in a liquid chemical tank 12 is primarily stored inside the membrane. In the meantime, the membrane is immersed from the inside of the membrane to the outside and turbid substance in the membrane is dissolved. Liquid chemical penetrated into the membrane is collected in the bottom of the immersion tank 3 and led to a waste liquid tank by the pump 13. Thereafter, the membrane is transferred to an ordinary filtration process. Since liquid chemical is penetrated into the membrane in this way and the membrane is washed, a small amount of liquid chemical is sufficient, and washing effect is increased because the membrane is exposed to the atmosphere.



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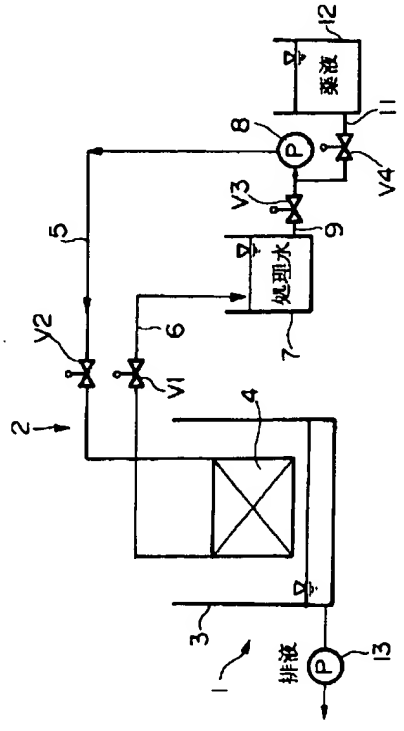
(54)【発明の名称】　浸漬型膜濾過装置における膜の薬液洗浄方法及び薬液洗浄装置

(57)【要約】

【目的】　洗浄時間を短縮できると共に、少量の薬液で洗浄が行える膜の薬液洗浄方法及び薬液洗浄装置を提供することにある。

【構成】　原水が貯溜された浸漬槽３内に浸漬した膜４の薬液洗浄方法において、前記浸漬槽内の原水を排水して前記膜を大気中に露出した後、前記膜に洗浄用の薬液を該膜の処理水側から原水側へ流して洗浄するか、又は、原水が貯溜された浸漬槽内に浸漬した膜の薬液洗浄方法において、前記浸漬槽内の原水から膜を上方へ移動させて膜を大気中に露出させ後、前記膜に洗浄用の薬液を該膜の処理水側から原水側へ流して洗浄する。



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【特許請求の範囲】

【請求項１】　原水が貯溜された浸漬槽内に浸漬した膜の薬液洗浄方法において、前記浸漬槽内の原水を排水して前記膜を大気中に露出した後、前記膜に洗浄用の薬液を該膜の処理水側から原水側へ流して洗浄することを特徴とする浸漬型膜濾過装置における膜の薬液洗浄方法。

【請求項２】　原水が貯溜された浸漬槽内に浸漬した膜の薬液洗浄方法において、前記浸漬槽内の原水から膜を上方へ移動させて膜を大気中に露出させ後、前記膜に洗浄用の薬液を該膜の処理水側から原水側へ流して洗浄することを特徴とする浸漬型膜濾過装置における膜の薬液洗浄方法。

【請求項３】　前記膜の洗浄において、洗浄用の薬液を膜に浸透させた後、供給する薬液を少量に切り換えることを特徴とする請求項１又は２記載の浸漬型膜濾過装置における膜の洗浄方法。

【請求項４】　浸漬槽内に浸漬した膜により原水を濾過する浸漬型膜濾過装置において、前記浸漬槽に該浸漬槽内の原水を排水して前記膜を大気中に露出する排水手段を設け、前記膜に洗浄用の薬液を該膜の処理水側から供給する薬液供給手段を備えたことを特徴とする浸漬型膜濾過装置における膜の薬液洗浄装置。

【請求項５】　浸漬槽内に浸漬した膜により原水を濾過する浸漬型膜濾過装置において、前記浸漬槽内の原水から前記膜を移動させて該膜を大気中に露出させる移動手段を設け、前記膜に洗浄用の薬液を該膜の処理水側から供給する薬液供給手段を備えたことを特徴とする浸漬型膜濾過装置における膜の薬液洗浄装置。

【請求項６】　前記薬液供給手段が、多量の洗浄用の薬液を供給する多量薬液供給手段と、少量の洗浄用の薬液を供給する少量薬液供給手段とからなることを特徴とする請求項４又は５記載の浸漬型膜濾過装置における膜の薬液洗浄装置。

【発明の詳細な説明】

【０００１】

【産業上の利用分野】本発明は、浸漬槽内に浸漬した膜により原水を濾過する浸漬型膜濾過装置に係り、その浸漬槽内の膜を薬液により洗浄する膜の薬液洗浄方法及び薬液洗浄装置に関する。

【０００２】

【従来の技術】従来、原水が貯留された浸漬槽内に膜（膜モジュールともいう）を浸漬して膜の濾過作用で原水を浄化する浸漬型の膜濾過装置がある。この膜濾過装置において、膜濾過を継続すると、濁質等により膜に目詰まりが生じ濾過効率が低下するので、一定時間使用したら膜を洗浄するようにしている。

【０００３】この洗浄方法としては、処理水を膜の処理水側から原水側に逆流させて洗浄する逆洗浄を行ったり、浸漬槽内の膜の下方に設けたエアーノズルからの気泡により膜の表面を洗浄するものなどがある。

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【０００４】さらに、一定期間使用すると、濁質等が膜内部まで入り込み、上記洗浄による効果が著しく低下するので、洗浄用の薬液を使用して膜を洗浄することになる。この場合、膜を装置から取り外して洗浄用の薬液が貯留された薬液洗浄槽に向けて移動させ、該薬液洗浄槽内に浸漬させて膜の薬液洗浄を行っていた。

【０００５】

【発明が解決しようとする課題】しかしながら、従来の薬液洗浄では、次のような問題点がある。膜を膜濾過装置から取り外して薬液洗浄槽に向けて移動させ薬液洗浄槽内に浸漬するので、クレーン等、膜の移動および取り外し・取り付けのための設備が必要となる。また、取り外し・取り付け作業に時間がかかるので、膜濾過装置の可動率が低下する。さらに、膜を薬液洗浄槽内に浸漬して洗浄するので、洗浄用の薬液が多量に必要となりコスト高となる。

【０００６】本発明は、上記問題点に鑑みてなされたもので、洗浄時間を短縮できると共に、少量の薬液で洗浄が行える膜の薬液洗浄方法及び薬液洗浄装置を提供することにある。

【０００７】

【課題を解決するための手段】本発明は上記課題を解決するため、次のように構成した。原水が貯溜された浸漬槽内に浸漬した膜の薬液洗浄方法において、前記浸漬槽内の原水を排水して前記膜を大気中に露出した後、前記膜に洗浄用の薬液を該膜の処理水側から原水側へ流して洗浄する膜の薬液洗浄方法とした。また、原水が貯溜された浸漬槽内に浸漬した膜の薬液洗浄方法において、前記浸漬槽内の原水から膜を上方へ移動させて膜を大気中に露出させ後、前記膜に洗浄用の薬液を該膜の処理水側から原水側へ流して洗浄する膜の薬液洗浄方法であってもよい。これらの洗浄において、洗浄用の薬液を膜に浸透させた後、供給する薬液を少量に切り換えて原水側に流してもよい。

【０００８】また、浸漬槽内に浸漬した膜により原水を濾過する浸漬型膜濾過装置において、前記浸漬槽に該浸漬槽内の原水を排水して前記膜を大気中に露出する排水手段を設け、前記膜に洗浄用の薬液を該膜の処理水側から供給する薬液供給手段を備えたことを特徴とする膜の薬液洗浄装置とした。また、浸漬槽内に浸漬した膜により原水を濾過する浸漬型膜濾過装置において、前記浸漬槽内の原水から前記膜を移動させて該膜を大気中に露出させる移動手段を設け、前記膜に洗浄用の薬液を該膜の処理水側から供給する薬液供給手段を備えたことを特徴とする膜の薬液洗浄装置であってもよい、前記各薬液供給手段は、多量の洗浄用の薬液を供給する多量薬液供給手段と、少量の洗浄用の薬液を供給する少量薬液供給手段とから構成するのがよい。

【０００９】

【作用】本発明によれば、次のように作用する。薬液供

給手段により洗浄用の薬液が膜の処理水側から膜に供給され、薬液が膜に浸透する。これにより膜が洗浄されることになる。この際、膜は原水中から大気中に露出されているので、膜を原水中に浸漬した状態で同様な方法で膜を洗浄した場合に比べて、膜の洗浄効果を高めることができる。さらに、多量薬液供給手段と少量薬液供給手段を備えたものにおいては、薬液が膜に浸透した後、供給する薬液を少量に切り換えて原水側に流して洗浄する。これにより、原水側に流出する薬液を少量におさえることができると共に、洗浄効果を向上させることができる。

【００１０】

【実施例】以下、本発明の実施例を図面に基づいて説明する。図１に、本発明の一実施例の薬液洗浄装置１が付設された浸漬型膜濾過装置２を示す。

【００１１】前記浸漬型膜濾過装置２は、原水が貯留される浸漬槽３と、この浸漬槽３内の原水中に浸漬される膜モジュール４とを備えて概略構成されている。この膜モジュール４は、中空糸膜（以下、膜と記す）を多数集積したものである。前記膜４ａは両端部を夫々連結すると共に、両端部で内側内を連通してある。この膜は原水が膜の外側（原水側）から膜の内側（処理水側）に透過して透過水（処理水）となる。

【００１２】前記膜モジュール４の両端部には、夫々配管５，６を接続してあり、一方の配管６には開閉弁Ｖ１を介装し、他方の配管５には開閉弁Ｖ２が介装されている。前記配管６には、処理水タンク７が接続されている。前記開閉弁Ｖ２よりも先端側にはポンプ８が接続されている。また、このポンプ８と前記処理水タンク７とが配管９により接続されており、この配管９には開閉弁Ｖ３が介装されている。さらに、この開閉弁Ｖ３と前記ポンプ８との間の配管９は、配管１１を介して薬液タンク１２に接続されている。この配管１１には開閉弁Ｖ４が介装されている。前記浸漬槽３の下部には、浸漬槽３内の原水を外に排出するポンプ１３が設けられている。

【００１３】なお、前記ポンプ８を、多量の薬液を供給する大容量のポンプ（多量薬液手段）と、少量の薬液を供給する少容量のポンプ（少量薬液手段）とを備えたものとしてもよい。

【００１４】次に、浸漬型膜濾過装置２の作動と膜の洗浄方法および薬液洗浄方法について説明する。

【００１５】先ず、本実施例の浸漬型膜濾過装置２により通常の濾過工程を行う場合を示す。すなわち、開閉弁Ｖ１，Ｖ２を開状態にすると共に、開閉弁Ｖ３，Ｖ４を閉状態にする。この状態で配管５，６に接続されたポンプ（図示せず）を作動すると、原水が膜の外側から膜を介して膜の内側に透過し、濾過される。膜の内側内の透過水は処理水タンク７に貯溜されることになる。

【００１６】このように、濾過工程が所定時間（例えば、濾過時間が３０～６０分）経ったら、膜の目詰まりを解消すべく、逆洗浄工程を所定時間（たとえば３０～６０秒間）行う。

【００１７】すなわち、前記開閉弁Ｖ１，Ｖ２を開状態に維持するとともにを配管５，６に接続されたポンプ（図示せず）が駆動状態とされ、これにより、逆洗水が膜の内側内に圧送され、膜の内側から外側に向けて流出して膜の目詰まりを解消する。逆洗水は前記した処理水タンク内の処理水を使用するのが通常であるが、別の逆洗用水槽からの水を使用してもよい。

【００１８】前記浸漬型膜濾過装置２により長期間（たとえば一ヶ月～数カ月）濾過を行うと、逆洗浄しても膜の目詰まりを解消することができなくなるので、洗浄用の薬液を用いた薬液洗浄工程を行う。

【００１９】この薬液洗浄工程では、まず、ポンプ１３を駆動して、浸漬槽３内の原水を排水して膜モジュール４を大気中に露出する。この排水された原水は、原水タンク（図示せず）に還流させてもよい。この状態で、開閉弁Ｖ１，Ｖ３を閉状態にすると共に、開閉弁Ｖ２，Ｖ４を開状態にする。この状態で、ポンプ８を駆動すると、薬液タンク１２内の薬液が配管１１，５を通って膜の内側内に供給されて一時貯留される。この貯留中に、供給された貯留された薬液は、膜の内側から膜外部に浸透して、膜内部に詰まった濁質等を溶解することになる。

【００２０】この際、ポンプ８を多量の薬液を供給する大容量のポンプ（多量薬液手段）と、少量の薬液を供給する少容量のポンプ（少量薬液手段）とを備えたものとした場合には、大容量のポンプを停止させた後に、小容量のポンプを駆動すると、薬液が膜モジュール４の膜の内部に押し込まれ、薬液が膜の内側から膜の内部を介して外側に向けて流出する。この際、膜の内部に侵入した濁質等がほぼ完全に除去される。

【００２１】このように膜を浸透した薬液は浸漬槽３の底部に溜る。浸漬槽３内に溜った薬液をポンプ１３を駆動することにより、別途設けた廃液タンク（図示せず）に貯留する。

【００２２】次に、薬液洗浄工程が終わったら、通常の濾過工程に移行する。しかし、膜の内側内には薬液が充填されたままであるので、通常の濾過工程の初期段階においては処理水に薬液が混入するので、上水の場合は不都合であるので、濾過工程の初期の透過水を処理水タンク７には入れないで、他のタンクに入れるのがよい。

【００２３】膜内に薬液を充填した後に、通常の濾過工程を行うようにしているが、開閉弁Ｖ４を閉状態とするとともに、開閉弁Ｖ１，Ｖ２，Ｖ３を開状態として、ポンプ８を駆動することにより、処理水タンク内の処理水を膜内側に供給して、供給された処理水により薬液を追い出すようにしてもよい。この場合、上水の場合は、このように追い出された薬液は、別途設けた廃液タンク（図示せず）に貯留する。一方下水の場合には追い出さ

れた薬液は、そのまま下水に流してもよい。

【００２４】なお、薬液は膜の種類や目詰まり物質の種類に応じて適宜の種類が使用されるが、水酸化ナトリウム溶液、塩酸溶液、次亜塩素ナトリウム溶液等が使用される。また、１種類の薬液を用いても、複数種類の薬液を２段に分けて使用するようにしてもよい。

【００２５】本実施例の膜の薬液洗浄装置及び薬液洗浄方法によれば、前記浸漬槽３内の原水を排水した後、前記膜に洗浄用の薬液を該膜の処理水側から原水側へ流して洗浄するようにしたので、適宜の薬液を用いれば膜の目詰まりをほぼ完全に洗浄することができる。しかも、使用できる状態で設置された膜に薬液を充填して洗浄するだけであるので、膜モジュール４を取り外したりする必要がなく、浸漬型膜濾過装置２の停止期間を最小限とすることができる。

【００２６】次に、図２に基づいて、本発明の他の実施例について説明する。なお、図１の実施例と同様な構成要素には同一符号を付して説明する。

【００２７】本実施例の薬液洗浄装置には、前記実施例と同様に、浸漬槽３内に貯留された原水内に膜モジュール４が浸漬されており、この膜モジュール４には、膜モジュール４を昇降させる図示しない移動手段（例えば、クレーン装置）が連結されている。また、膜モジュール４を浸漬槽３の上方に上昇させたときに、膜モジュール４と浸漬槽３の上縁との間に水平移動される受け皿２０が設けられている。この受け皿２０は、膜モジュール４を薬液洗浄したときに膜モジュール４がしみ出る薬液を受けるために設けられるものである。

【００２８】そして、本実施例の薬液洗浄装置によれば、図２（ａ）に示す状態から、移動手段を駆動して膜モジュール４を浸漬槽３内の原水の液面よりも上方に移動させる。次いで、膜モジュール４と浸漬槽３との間に受け皿２０を水平移動させる（図２（ｂ））。この後、膜モジュール４の膜内に前記実施例と同様に薬液を充填する。これにより、薬液が膜を通して膜の外側にしみ出し廃液として受け皿２０内に溜る。

【００２９】次に、図２（ｃ）に示すように、膜内に処理水を送りだして薬液を押し出す。この後、図２（ｄ）に示すように、受け皿２０を水平移動させて浸漬槽３の上方から退避させた後、膜モジュール４を下降させ、浸漬槽３内に浸漬して、通常の濾過工程を行う。このように、受け皿２０を設けることにより、浸漬槽の原水を全部抜かなくても薬液洗浄が行える。よって、薬液洗浄工程の処理時間を短縮できる。

【００３０】図３に本発明の更に他の実施例を示す。図１及び図２に示した実施例と同様な構成要素には同一符号を付して説明する。

【００３１】すなわち、図３に示すものは、受け皿２０を浸漬槽３の内部で浸漬槽３の高さ方向中間部に、垂直に垂下した状態と水平に位置する状態とに、支点部２１を中心として、揺動自在に設けたものである。

【００３２】このものでは、浸漬槽３内の一部の原水を排水して、前記受け皿２０を水平に位置した状態にした場合に受け皿２０が液面上に露出するようにする。そして、膜モジュール４を上方に移動させて、原水の液面以上の高さであって、受け皿２０を水平状態とした高さよりも少し上に位置させる。次いで、受け皿２０を支点部２１を中心として揺動させて水平な状態とする。

【００３３】次に、前記実施例と同様に、薬液を膜モジュール４の膜内に薬液を送り込んで、薬液を膜の内側から外側に浸透させて膜の洗浄を行う。膜の外側に浸透した薬液は受け皿２０に溜るので、これを受け皿２０に設けた配管からポンプ２２により吸い出す。

【００３４】受け皿２０を揺動するためには、図４に示すように、浸漬槽３の上部に固定されたウインチ２３により受け皿２０に連係されたワイヤ２４を巻取るようにしてもよい。

【００３５】なお、本発明は上記実施例に限るものではなく、例えば、中空糸膜に変えて平膜やスパイラル膜および管状膜等を使用してもよい。また、ポンプ８が流量を変えられる１台のポンプであってもよく、一定量の定量ポンプと流量制御弁を組合わせたものでもよい。さらに、一台のポンプで薬液を供給するだけでもよく、その薬液を膜を介して循環させるようにしてもよい。

【００３６】

【発明の効果】本発明は、以上のように構成したので、次のような効果がある。薬液供給手段により洗浄用の薬液が膜の処理水側から膜に供給され、薬液が膜に浸透する。これにより膜が洗浄されることになる。この際、膜は原水中から大気中に露出されているので、膜を原水中に浸漬した状態で同様な方法で膜を洗浄した場合に比べて、膜の洗浄効果を高めることができる。さらに、多量薬液供給手段と少量薬液供給手段を備えたものにおいては、薬液が膜に浸透した後、供給する薬液を少量に切り換えて原水側に流して洗浄する。これにより、原水側に流出する薬液を少量におさえることができると共に、洗浄効果を向上させることができる。取り外し・取り付け作業の時間が不要となるので、装置の可動率が向上する。さらに、洗浄用の薬液は膜の内側に供給する量だけとなるので、膜を薬液洗浄槽内に浸漬して洗浄するのに比して、薬液が少量ですみ、低コストにできる。

【図面の簡単な説明】

【図１】本発明の一実施例の膜の薬液洗浄装置が付設された浸漬型膜濾過装置の概略構成図である。

【図２】本発明の他の実施例の膜の薬液洗浄装置が付設された浸漬型膜濾過装置及びこれを用いた薬液洗浄方法を示す工程図である。

【図３】本発明の更に他の実施例の膜の薬液洗浄装置が付設された浸漬型濾過装置の概略構成図である。

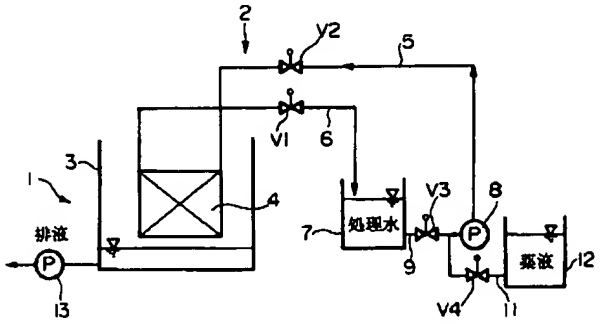
【図４】本発明の更に他の実施例の膜の薬液洗浄装置が

付設された浸漬型濾過装置の概略構成を示す図である。

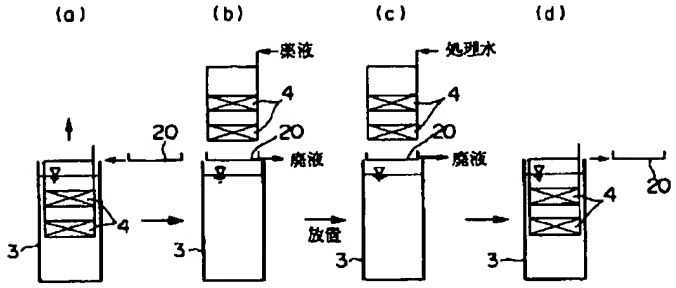
【符号の説明】

1　薬液洗浄装置
2　浸漬型膜濾過装置
3　浸漬槽
＊4　膜モジュール
8　ポンプ
13　ポンプ
20　受け皿

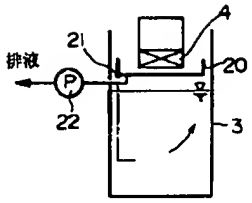
【図1】



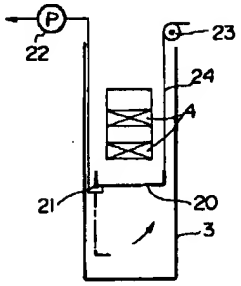
【図2】



【図3】



【図4】



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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the dipping former membrane filtration equipment which filters raw water with the film immersed in the immersion tub, and relates to the membranous drug solution washing approach and membranous drug solution washing station which wash the film in the immersion tub with a drug solution.
[0002]
[Description of the Prior Art] Conventionally, there is membrane filtration equipment of the dipping former which is immersed in the film (it is also called a membrane module) in the immersion tub in which raw water was stored, and purifies raw water by membranous filtration. If fixed time amount use is carried out, he is trying to wash the film in this membrane filtration equipment, since blinding will arise on the film by a suspended matter etc. and a filtration efficiency will fall, if membrane filtration is continued.
[0003] Reverse washing which treated water is made to flow backwards to a raw water side, and washes it from a membranous treated water side as this washing approach is performed, or there are some which wash a membranous front face with the air bubbles from the air jet hole which the film in an immersion tub prepared caudad.
[0004] Furthermore, if fixed period use is carried out, since a suspended matter etc. will enter to the interior of the film and the effectiveness by the above-mentioned washing will fall remarkably, the film will be washed using the drug solution for washing. In this case, you made it move towards the drug solution washing tub in which the film was removed from equipment and the drug solution for washing was stored, you made it immersed in this drug solution washing tub, and membranous drug solution washing was performed.
[0005]
[Problem(s) to be Solved by the Invention] However, there are the following troubles in the conventional drug solution washing. Since remove the film from membrane filtration equipment, it is made to move towards a drug solution washing tub and it is immersed in a drug solution washing tub, the facility for migration of film, such as a crane, and removal and installation is needed. Moreover, since removal / installation activity takes time amount, the rate of movable of membrane filtration equipment falls. Furthermore, since it is immersed in a drug solution washing tub and the film is washed, the drug solution for washing is needed for a large quantity, and serves as cost quantity.
[0006] This invention is to offer the membranous drug solution washing approach and membranous drug solution washing station which can wash with a small amount of drug solution while it was made in view of the above-mentioned trouble and can shorten washing time amount.
[0007]
[Means for Solving the Problem] This invention was constituted as follows in order to solve the above-mentioned technical problem. In the drug solution washing approach of the film immersed in the immersion tub in which raw water was stored, after draining the raw water in said immersion tub and exposing said film into atmospheric air, it considered as the drug solution washing approach of the film which pours and washes the drug solution for washing from the treated water side of this film to a raw water side on said film. Moreover, in the drug solution washing approach of the film immersed in the immersion tub in which raw water was stored, the film may be moved upwards from the raw water in said immersion tub, the film may be exposed into atmospheric air, and you may be the drug solution washing approach of the film which pours and washes the drug solution for washing from the treated water side of this film to a raw water side on said film the back. In these washing, after making the drug solution for washing permeate the film, the drug solution to supply may be switched a little and you may pass to a raw water side.
[0008] Moreover, in the dipping former membrane filtration equipment which filters raw water with the film immersed in the immersion tub, a wastewater means drained the raw water in this immersion tub to said immersion tub, and exposed said film into atmospheric air was established, and it considered as the drug solution washing station of the film characterized by having a drug solution supply means to supply the drug solution for washing to said film from the treated water side of this film. Moreover, it sets to the dipping former membrane filtration equipment which filters raw water with the film immersed in the immersion tub. A migration means to move said film from the raw water in said immersion tub, and to expose this film into atmospheric air is established. Said each drug solution supply means which may be the drug solution washing station of the film characterized by equipping said film with a drug solution supply means to supply the drug solution for washing from the treated water side of this film It is good to constitute from an abundant drug solution supply means to supply a lot of drug solutions for washing, and a little drug solution supply means to supply a small amount of drug solution for washing.
[0009]
[Function] According to this invention, it acts as follows. The drug solution for washing is supplied to the film from a membranous treated water side by the drug solution supply means, and a drug solution permeates the film. The film will be washed by this. Under the present circumstances, since the film is exposed into atmospheric air out of raw water, compared with the case where the film is washed, a membranous cleaning effect can be heightened by the same approach in the condition that the film was immersed into raw water. Furthermore, in the thing equipped with the abundant drug solution supply means and the little drug solution supply means, after a drug solution permeates the film, the drug solution to supply is switched a little, and it passes and washes to a raw water side. A cleaning effect can be raised while being able to press down by this the drug solution which flows into a raw water side a little.
[0010]
[Example] Hereafter, the example of this invention is explained based on a drawing. The dipping former membrane filtration equipment 2 with which the drug solution washing station 1 of one example of this invention was attached to drawing 1 is shown.
[0011] Said dipping former membrane filtration equipment 2 is equipped with the immersion tub 3 in which raw water is stored, and the membrane

module 4 immersed into the raw water in this immersion tub 3, and the outline configuration is carried out. This membrane module 4 accumulates many hollow fibers (it is hereafter described as the film). Said film 4a has opened the inside of the inside for free passage at both ends while connecting both ends, respectively. Raw water penetrates this film inside membranous (treated water side) from a membranous outside (raw water side), and it serves as permeated water (treated water).

[0012] Piping 5 and 6 is connected to the both ends of said membrane module 4, respectively, the closing motion valve V1 is infixed in one piping 6, and the closing motion valve V2 is infixed in the piping 5 of another side. The treated water tank 7 is connected to said piping 6. The pump 8 is connected to the tip side rather than said closing motion valve V2. Moreover, this pump 8 and said treated water tank 7 are connected by piping 9, and the closing motion valve V3 is infixed in this piping 9. Furthermore, the piping 9 between this closing motion valve V3 and said pump 8 is connected to the drug solution tank 12 through piping 11. The closing motion valve V4 is infixed in this piping 11. The pump 13 which discharges the raw water in the immersion tub 3 outside is formed in the lower part of said immersion tub 3.

[0013] In addition, it is good also as a thing equipped with the mass pump (abundant drug solution means) which supplies a lot of drug solutions for said pump 8, and the pump (little drug solution means) of the few capacity which supplies a small amount of drug solution.

[0014] Next, actuation of dipping former membrane filtration equipment 2, the membranous washing approach, and the drug solution washing approach are explained.

[0015] First, the case where the dipping former membrane filtration equipment 2 of this example performs the usual filtration process is shown. That is, while changing the closing motion valves V1 and V2 into an open condition, the closing motion valves V3 and V4 are made into a closed state. If the pump (not shown) connected to piping 5 and 6 in this condition is operated, from a membranous outside, through the film, raw water will penetrate inside membranous and will be filtered. The permeated water in the membranous inside will be stored by the treated water tank 7.

[0016] Thus, if a filtration process passes predetermined time (for example, filtration time amount is 30 - 60 minutes), a reverse washing process will be performed predetermined time (for example, for 30 - 60 seconds) that membranous blinding should be canceled.

[0017] That is, the pump (not shown) by which ** was connected to piping 5 and 6 as if said closing motion valves V1 and V2 are maintained in the open condition is made into a drive condition, thereby, back wash water is fed in the membranous inside, flows out of the membranous inside towards an outside, and membranous blinding is canceled. although it usually comes out of back wash water to use the treated water in said treated water tank carried out -- another back wash -- service water -- the water from a tub may be used.

[0018] Since it becomes impossible to cancel membranous blinding if it filters with said dipping former membrane filtration equipment 2 for a long period of time (for example, one month - several months) even if it reverse-washes, the drug solution washing process using the drug solution for washing is performed.

[0019] At this drug solution washing process, first, a pump 13 is driven, the raw water in the immersion tub 3 is drained, and a membrane module 4 is exposed into atmospheric air. This drained raw water may make a raw water tank (not shown) flow back. In this condition, while making the closing motion valves V1 and V3 into a closed state, the closing motion valves V2 and V4 are changed into an open condition. In this condition, if a pump 8 is driven, the drug solution in the drug solution tank 12 will be supplied in the membranous inside through piping 11 and 5, and will be stored temporarily. The stored drug solution which was supplied during this reservoir will permeate the film exterior from the membranous inside, and will dissolve the suspended matter got blocked in the interior of the film.

[0020] under the present circumstances, when it shall have the mass pump (abundant drug solution means) which supplies a lot of drug solutions for a pump 8, and the pump (little drug solution means) of the few capacity which supplies a small amount of drug solution If the pump of small capacity is driven after stopping a mass pump, a drug solution will be stuffed into the interior of the film of a membrane module 4, and a drug solution will flow out of the membranous inside towards an outside through the interior of membranous. Under the present circumstances, the suspended matter which trespassed upon the interior of membranous is removed nearly completely.

[0021] Thus, the drug solution which permeated the film collects on the pars basilaris ossis occipitalis of the immersion tub 3. By driving a pump 13, the drug solution which collected in the immersion tub 3 is stored in the waste fluid tank (not shown) formed separately.

[0022] Next, if a drug solution washing process finishes, it will shift to the usual filtration process. However, it is good to put into other tanks without putting the permeated water in early stages of a filtration process into the treated water tank 7 since it fills up with a drug solution in the membranous inside, and a drug solution mixes in treated water in the initial stage of the usual filtration process, and it is inconvenient in the case of a waterworks.

[0023] While making the closing motion valve V4 into a closed state although it is made to perform the usual filtration process after being filled up with a drug solution in the film, the treated water in a treated water tank is supplied to the film inside, and you may make it drive out a drug solution with the supplied treated water by driving a pump 8 by making the closing motion valves V1, V2, and V3 into an open condition. In this case, the drug solution with which it ******ed in this way in the case of the waterworks is stored in the waste fluid tank (not shown) formed separately. On the other hand, the drug solution which was driven out in the case of sewage may be poured with sewage as it is.

[0024] In addition, although, as for a drug solution, a proper class is used according to a membranous class or the class of blinding matter, a sodium-hydroxide solution, the solution of hydrochloric acid, the following ****** sodium solution, etc. are used. Moreover, you may make it use two or more kinds of drug solutions for two steps, dividing, using one kind of drug solution.

[0025] Since according to the membranous drug solution washing station and the membranous drug solution washing approach of this example the drug solution for washing is poured to a raw water side on said film and was washed from the treated water side of this film on it after draining the raw water in said immersion tub 3, if a proper drug solution is used, membranous blinding can be washed nearly completely. And since a drug solution is only filled up with and washed on the film installed in the condition that it can be used, it is not necessary to remove a membrane module 4, and the halt period of dipping former membrane filtration equipment 2 can be made into the minimum.

[0026] Next, other examples of this invention are explained based on drawing 2 . In addition, the same sign is attached and explained to the same component as the example of drawing 1 .

[0027] It is immersed in the membrane module 4 like said example in the raw water stored in the immersion tub 3, and a migration means (for example, crane equipment) which is not illustrated to make this membrane module 4 go up and down a membrane module 4 is connected with the drug solution washing station of this example. Moreover, when raising a membrane module 4 above the immersion tub 3, the saucer 20 by which horizontal migration is carried out is formed between the membrane module 4 and the upper limb of the immersion tub 3. It is prepared in order that this saucer 20 may receive the drug solution with which a membrane module 4 oozes, when drug solution washing of the membrane module 4 is carried out.

[0028] And according to the drug solution washing station of this example, from the condition shown in drawing 2 (a), a migration means is driven and a membrane module 4 is moved more nearly up than the oil level of the raw water in the immersion tub 3. Subsequently, horizontal migration of the saucer 20 is carried out between a membrane module 4 and the immersion tub 3 (drawing 2 (b)). Then, it is filled up with a drug solution like said example in the film of a membrane module 4. Thereby, a membranous outside is covered with a drug solution in a saucer 20 as exudation waste

fluid through the film.

[0029] Next, as shown in drawing 2 (c), treated water is sent out in the film and a drug solution is extruded. Then, after carrying out horizontal migration of the saucer 20 and making it evacuate from the upper part of the immersion tub 3 as shown in drawing 2 (d), a membrane module 4 is dropped, it is immersed in the immersion tub 3, and the usual filtration process is performed. Thus, by forming a saucer 20, even if it all does not drain the raw water of an immersion tub, drug solution washing can be performed. Therefore, the processing time of a drug solution washing process can be shortened.

[0030] The example of further others of this invention is shown in drawing 3 . The same sign is attached and explained to the same component as the example shown in drawing 1 and drawing 2 .

[0031] That is, what is shown in drawing 3 forms a saucer 20 in the condition of being located in the height direction pars intermedia of the immersion tub 3 at a level with the condition of having hung perpendicularly, free [rocking] focusing on the supporting-point section 21 inside the immersion tub 3.

[0032] Some raw water in the immersion tub 3 is drained, and when said saucer 20 is changed into the condition of having been located horizontally, it is made exposed [a saucer 20 / on an oil level] in this thing. And a membrane module 4 is moved up, and you are the height more than the oil level of raw water, and make it located upwards for a while rather than the height which made the saucer 20 the level condition. Subsequently, the supporting-point section 21 is made to rock as a core, and a saucer 20 is made into a level condition.

[0033] Next, send in a drug solution for a drug solution in the film of a membrane module 4, a drug solution is made to permeate outside from the membranous inside like said example, and the film is washed. Since a saucer 20 is covered with the drug solution which permeated the membranous outside, it sucks out of piping which prepared this in the saucer 20 with a pump 22.

[0034] In order to rock a saucer 20, you may make it roll round the wire 24 coordinated with the saucer 20 by the winch 23 fixed to the upper part of the immersion tub 3, as shown in drawing 4 .

[0035] In addition, this invention may not be restricted to the above-mentioned example, and may be changed into a hollow fiber, for example, may use a flat film, the spiral film, the tubular film, etc. Moreover, a pump 8 may be one set of the pump into which a flow rate is changeable, and what combined the metering pump and flow control valve of a constant rate may be used. Furthermore, it is also good to supply a drug solution by one set of a pump, and you may make it circulate the drug solution through the film.

[0036]

[Effect of the Invention] Since this invention was constituted as mentioned above, it has the following effectiveness. The drug solution for washing is supplied to the film from a membranous treated water side by the drug solution supply means, and a drug solution permeates the film. The film will be washed by this. Under the present circumstances, since the film is exposed into atmospheric air out of raw water, compared with the case where the film is washed, a membranous cleaning effect can be heightened by the same approach in the condition that the film was immersed into raw water. Furthermore, in the thing equipped with the abundant drug solution supply means and the little drug solution supply means, after a drug solution permeates the film, the drug solution to supply is switched a little, and it passes and washes to a raw water side. A cleaning effect can be raised while being able to press down by this the drug solution which flows into a raw water side a little. Since the time amount of removal / installation activity becomes unnecessary, the rate of movable of equipment improves. Furthermore, since the drug solution for washing serves as only an amount supplied inside membranous as compared with being immersed in a drug solution washing tub and washing the film, a drug solution is little, ends and is made into low cost.

[Translation done.]

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CLAIMS

[Claim(s)]
[Claim 1] The drug solution washing approach of the film in the dipping former membrane filtration equipment characterized by pouring and washing the drug solution for washing from the treated water side of this film to a raw water side on said film after draining the raw water in said immersion tub and exposing said film into atmospheric air in the drug solution washing approach of the film immersed in the immersion tub in which raw water was stored.
[Claim 2] The drug solution washing approach of the film in the dipping former membrane filtration equipment characterized by moving the film upwards from the raw water in said immersion tub, exposing the film into atmospheric air in the drug solution washing approach of the film immersed in the immersion tub in which raw water was stored, and pouring and washing the drug solution for washing from the treated water side of this film to a raw water side on said film the back.
[Claim 3] The washing approach of the film in the dipping former membrane filtration equipment according to claim 1 or 2 characterized by switching the drug solution to supply a little in washing of said film after making the drug solution for washing permeate the film.
[Claim 4] The drug solution washing station of the film in the dipping former membrane-filtration equipment characterized by to have a drug solution supply means establishes a wastewater means drain the raw water in this immersion tub to said immersion tub, and expose said film into atmospheric air in the dipping former membrane-filtration equipment which filters raw water with the film immersed in the immersion tub, and supply the drug solution for washing to said film from the treated-water side of this film.
[Claim 5] The drug solution washing station of the film in the dipping former membrane-filtration equipment characterized by to have a drug solution supply means establishes a migration means move said film from the raw water in said immersion tub, and expose this film into atmospheric air in the dipping former membrane-filtration equipment which filters raw water with the film immersed in the immersion tub, and supply the drug solution for washing to said film from the treated-water side of this film.
[Claim 6] The drug solution washing station of the film in the dipping former membrane filtration equipment according to claim 4 or 5 characterized by said drug solution supply means consisting of an abundant drug solution supply means to supply a lot of drug solutions for washing, and a little drug solution supply means to supply a small amount of drug solution for washing.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the outline block diagram of the dipping former membrane filtration equipment with which the drug solution washing station of the film of one example of this invention was attached.
[Drawing 2] It is process drawing showing the drug solution washing approach using the dipping former membrane filtration equipment and this by which the drug solution washing station of the film of other examples of this invention was attached.
[Drawing 3] It is the outline block diagram of the dipping former filter with which the drug solution washing station of the film of the example of further others of this invention was attached.
[Drawing 4] It is drawing showing the outline configuration of the dipping former filter with which the drug solution washing station of the film of the example of further others of this invention was attached.
[Description of Notations]
1 Drug Solution Washing Station
2 Dipping Former Membrane Filtration Equipment
3 Immersion Tub
4 Membrane Module
8 Pump
13 Pump
20 Saucer

[Translation done.]

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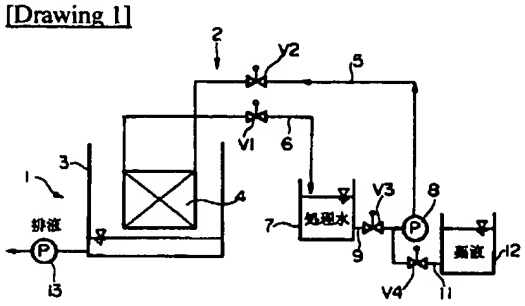
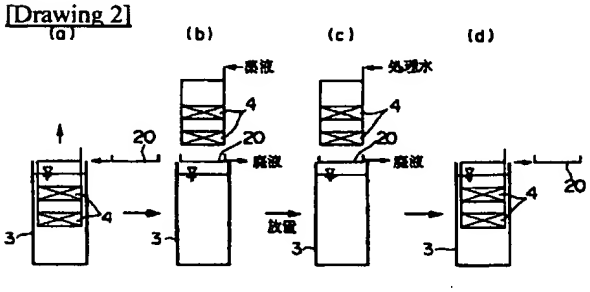
DRAWINGS

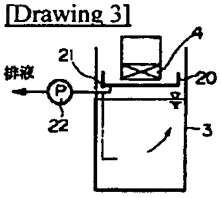
[Drawing 1]



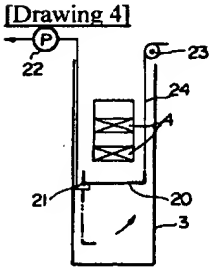
[Drawing 2]



[Drawing 3]



[Drawing 4]



[Translation done.]